RTCA Special Committee 186, Working Group 5

ADS-B UAT MOPS

Meeting #7

Comparison of MITRE and JHUAPL Models of UAT In the LA Basin 2020 Scenario

Prepared by Warren J. Wilson
The MITRE Corp.

SUMMARY
This paper addresses Action Item 6-5

Action Item 6-5 asks that a comparison be made between the UAT model implemented by MITRE and the model developed by JHUAPL to establish their compatibility. Specifically, it was requested that figure 9 of UAT-WP-6-09 (MITRE model) be compared with the figure on page 1-11 of the addendum to UAT-WP-6-11 (JHUAPL model). However, it was determined that these two figures are not directly comparable because the scenario in 1-11 includes DME interference and figure 9 does not. Because of this it was decided to compare figure 9 with the figure on page 1-3 of the addendum. The curves on page 1-3 predict the message success probability (MSR) in the LA basin 2020 scenario with self-interference only. One of the curves in figure 9 also predicts basically the same thing, so a direct comparison should be possible.

The bottom curve in figure 9 assumes that the UAT transmit power is 25 watts, so it was decided to compare this with the A2 curves on page 1-3. The power of an A2 transmi tter is specified to be between 12.5 watts and 32 watts. The receiver bandwidth in figure 9 is assumed to be 1.2 MHz, while the expectations for 1.2 MHz and 0.8 MHz are both plotted on page 1-3. The curves show there is not much difference between the two bandwidths vis-à-vis self-interference performance. The comparison can be seen in figure 1.

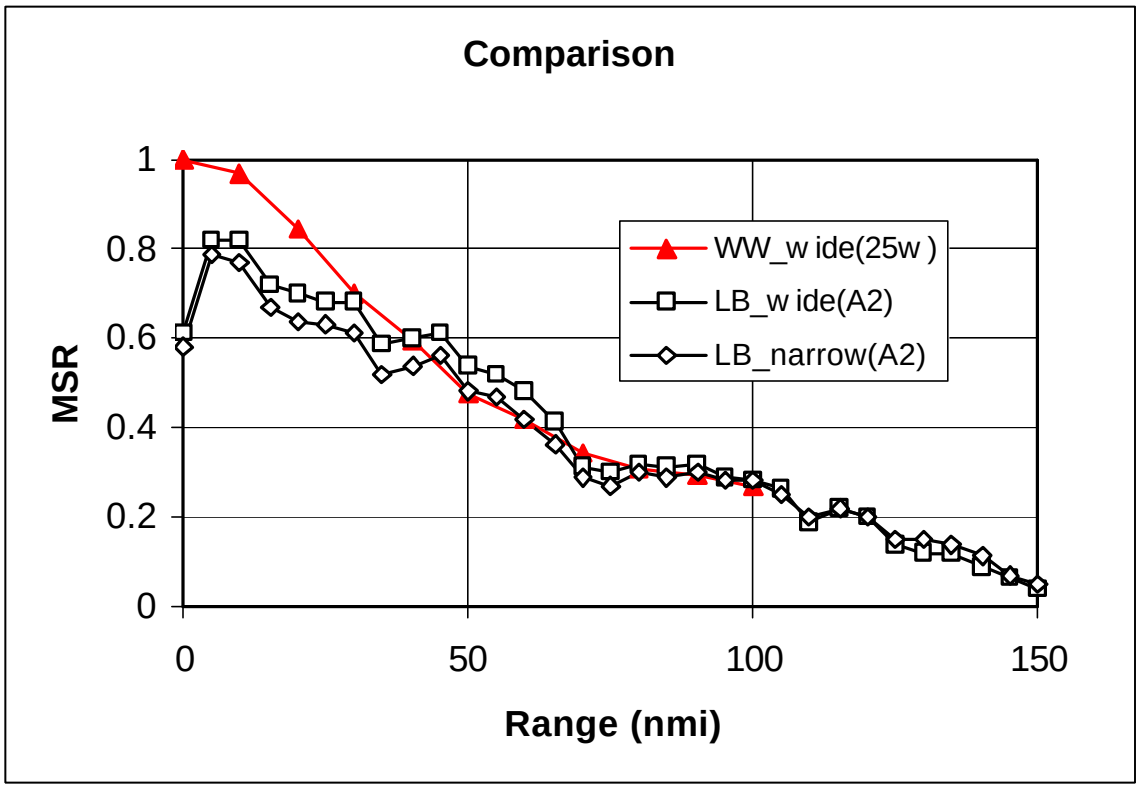

Figure 1. Model Comparison. LA Basin 2020 Unloaded Scenario

In the figure, the curve labeled WW is the result of the MITRE model, and the curves labeled LB are the results of the JHUAPL model. Over most of the range where the two models overlap, the agreement is very good. At short UAT ranges, the JHUAPL model

predicts a lower success rate than the MITRE model. This difference is most likely due to the fact that the MITRE model assumes omnidirectional antenna patterns, while more realistic patterns are included in the JHUAPL model. Real blade antenna pattern have reduced gain near the zenith and/or nadir which can create “cones of silence” above and below an aircraft.

In summary, it seems that the two models are in very good agreement (with the possible exception of differences in antenna patterns), at least in their predictions for the so-called “unloaded” cases.